HOME-BASED ENTERPRISES IN CITIES OF DEVELOPING COUNTRIES

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Introduction

Dwellings can provide not only shelter and amenities but also an income through rental space or use as a shop.[1] Such income helps to finance the dwelling and its improvement. But policy makers have generally opposed work-at-home urban design because of devotion to uni-functional land use theories and because of a moralistic bias against private economic gain from social housing support. Moreover, home businesses are thought to be unproductive sweatshops with no future.

Yet these capital-generating, capital-saving home enterprises remain almost as widespread in LDC's as they were in Europe before the Industrial Revolution. A brief vogue in favor of "cottage industries" during the 1950's faded with wasteful experience in India. Stress on the "informal sector" came after 1971 but included negligible concern about the location of these enterprises. The thesis of this article is that location and related costs and opportunities do matter. Better policies can improve income, employment, and housing (three-in-one-blow).

We begin with a respectful search of the literature to determine why Adam Smith, Marx, Marshall, etc., had little to say about the housing aspect of home businesses. Was it that economic historians had not yet probed the subject thoroughly? After noting that the new household models (Becker, et al.) also abstract from location, a brief review of the development literature follows.

The ability or need to move enterprises out of dwellings is a critical transition. It is not just a change of address for a bit more space. A

two-sector model of the process can show the advantages of retarding the transition to improve income, employment, and housing itself. In most countries home businesses will proliferate while declining in relative importance, but some types will fare better than others. The classification of types should not, however, be merely in terms of specific products or services but should take into account locational and household traits. All of this has policy implications and will be illustrated with data from Peru, Sri Lanka, and Zambia.

Home-based Enterprises in History

For the classical economists, living quarters attached to one's place of business were natural. The interesting, apparently unprecedented, development was the spread of centralized workshops using machinery. Organization and technology needed explanation, not the capital cost of buildings or their site. In the not-so-long run, buildings were in elastic supply, thought Adam Smith, since "no species of labor . . . seems more easy to learn than that of masons or bricklayers." Ground rents might be higher in parts of town with "the greatest demand . . . whether for trade and business, for pleasure and society, or for mere vanity and fashion" (Smith, 1776/1937, pages 103, 792). But cities were then much too small to create site value differentials large enough to influence the mode of production.

Like Smith, Marx concentrated on workers, equipment, the volume of output, and ignored the premises. However, he did note "the impossibility of wringing [owners] out of capital" to provide "the very least space that should be allowed for each person" (Marx, 1867/1937, pages 527-528). Location was the sort of trivia he left to Engels who feared that cheap

housing with workshops meant "the worker was chained to the antiquated method of individual production and hard labor" (Engels, 1887, page 11).

Alfred Marshall as usual was on the ball and applied agricultural location theory from von Thunen to the use and value of urban land, but like his predecessors, he saw the factory-versus-home-business choice determined by technology, not the cost of the alternative sites (Marshall, 1890/1947, pages 442, 747). The point of the present article is to show the role of space, place and family.

A home-based enterprise (HBE) is not just a small business in a small structure, but a family operation in a dwelling, a "functional and organizational unit of production, generative reproduction, and consumption within the social formation of the 'ganze Haus'," as an economic historian has put it (Brunner, 1968, pages 103-127, cited in Medick, 1976, page 297; see also Chayanov, 1925/1966). In predominantly rural times, making things at home was a normal part of life: ". . . The family made many things it needed, aided by village or wandering craftsmen" who had tools but no capital in the form of a workshop (Heaton, 1948, pages 131, 343). Such "usufacture" developed into retail and wholesale handicrafts, especially the putting-out system. The family basis of working continued, and as late as the 18th century, if volume allowed the engaging of journeymen, their payment was mainly in kind -- food and lodging (Kisch, 1972, page 353, italics supplied).

Rising volume, "the extent of the market," in principle allowed the subdivision of labor without machinery in centralized workshops, given management skills and capital for buildings. When large buildings happened to become available, as with the dissolution of English monasteries in the 16th century, some merchants did attempt to convert putting-out enterprises

into workshops, filling abbeys with looms. But constructing large buildings was extremely costly, and "in general, where the same equipment and processes could be used at home as in the large shops, the domestic worker held his ground" (Heaton, 1948, page 349). Or as Wittfogel said more forcefully, "a famishing Lilliputian cottage industry choked off large industry" (Wittfogel, 1931, page 670, quoted in Medick, 1976, page 300; see also Kriedte, Medick, and Schlumbohm, 1977). What mattered were relative costs of factors of production, especially labor and buildings, not the resistance of gilds to any form of change. Gild power had been greatly overestimated by the laissez-faire economists, especially gild strength in seaports and in textile centers that manufactured for export (Thrupp, 1965, page 230). If some of the early workshops did locate in the countryside, they mainly followed the source of raw materials or water power; but the country was also where agricultural transformations had created an underemployed, often landless population that would be a cheaper labor force if new housing did not have to be built. Specifically, the children of these "paupers" were the preferred labor force for the earliest British factories (Pollard, 1965, pages 160-165).

If there was a shortage of housing, hence workers, at a site, the enterprise was likely to supply it directly, building a factory village, rather than raising wages and leaving construction to the market. A different approach was that of Matthew Boulton who housed his workers on the top floor of his first Soho factory (Pollard, 1965, page 200). Such arrangements were hardly HBEs, however, in which all members of a household, plus one or two journeymen or apprentices, divided their time between market-oriented and domestic tasks. The sorts of issues raised by the new household economics were absent.

Household Production Models

The household production models pioneered by Gary Becker (1965, 1981) brought capital theory, marriage, fertility, and intra-family distribution of income and work into an integrated analysis with the standard neo-classical "assumptions of maximizing behavior, stable preferences, and equilibrium in implicit or explicit markets" (Becker, 1981, page ix). Critics have noted that these assumptions work well for several issues but not the make-or-buy choice or whether any part of home production should be for the market (Hannan, 1982; Ben-Porath, 1982; Pollak, 1985). In his chapters on the "Division of Labor" and "The Evolution of the Family," Becker notes that limited information and problems with monitoring can lead to shirking, pilfering, or other malfeasance in a way that limits the feasible size of both households and home production. He suggests that family businesses must nevertheless be important even in the United States since over a third of manufacturing firms and over two-thirds of retailers, etc., had no more than three paid employees, and many had none in the early 1970's. Since average household size was 3.1 and since more than half had no children under 18 years, he inferred that innumerable small businesses were family operations (Becker, 1981, pages 30-37). Becker, however, takes no interest in the presence of five million of these HBEs (other than farms) in the dwellings themselves, nor in the rationale for moving others out or discontinuing them. The related rising market productivity of women and its importance is recognized but not explained.

According to his critics, the shifting border between household and market production cannot be explained with Becker's model precisely because of its neoclassical postulation of implicit perfect markets with anonymous buyers and sellers. Since interpersonal and other frictions do exist,

according to Ben-Porath, the comparative advantage of HBEs lies in the possibility that "transactions between mutually identified partners who expect to be connected for a long time are . . . more efficient because the behavior is based on self-enforcement of implicit contracts . . . the transactional advantages of the family can beat the allocative advantages and the returns to scale associated with market specialization" in some activities (Ben-Porath, 1982, page 61). What those activities are depends in part on the relevance of scale, technology, the preference of workers for being at home, and in part on the cost of capital, including that in the form of dwellings, all subjects of this article.

Pollak states in his review of the literature, that "by assuming that all firms are frictionless maximizers . . . economists have virtually ignored family firms. The major exceptions fall into two subfields -- development economics and economic history -- but as a consequence of the limitations of theory and data, the treatment of family firms is largely anecdotal" (Pollak, 1985, page 593). Since the evidence from economic history has already been sketched above, a brief review of the development literature is in order before presenting our own data and bit of theory. Worth mentioning at this point, however, is that Becker-like household models have been applied sufficiently often to farms in developing countries to have merited a review of that literature (Strauss, 1984).

Cottage Industries, Petty Commodity Production, and the Informal Sector

In the early development literature of the 1950's the potential of home-based or cottage industries was recognized precisely because capital could be saved with fewer buildings and less infrastructure (Aubrey, 1951; Bose, 1954). But the Indian government in the Gandhian tradition supported

cottage production so inefficiently with subsidies, guaranteed supplies and markets, as well as with restrictions on competing factories that the policy was discredited throughout the world for over a decade (Dandekar, 1957; Hoselitz, 1959; Dhar and Lydall, 1961; Reddaway, 1962; Bhalla, 1964). Some development economists rejected the assumption that the supply of capital is fixed and even supported "the establishment of industries in cities precisely because it compels additional or complementary capital formation that otherwise might never have taken place" (Hirschman, 1958, page 144).

Meanwhile, Marxists continued to see HBEs as "Petty Commodity Production," an unproductive set of family businesses that over-exploit themselves and transfer the surplus to the capitalist sector because cheaper wage goods allow lower wages (Gerry, 1978; others surveyed in Moser, 1978; Moser, 1984). The present article, by contrast, tries to show that, while some HBE employees may work too hard for too little, this underpayment is not general but goes with strengths that will make the HBE sector fade too slowly, if at all, to be called "transitory."

Another group hostile to HBEs or integrated work-at-home urban design have been the physical urban planners. Their preference has been for separating living, working, and recreational areas in what Le Corbusier called a "radio-concentric city of exchanges." For example, in Chandigarh, the new capital of the Indian Punjab, they insisted on a network of seven road types and on unaffordably high standards for dwellings. Construction workers could not rent or buy the cheapest dwellings that they themselves were building and had to live in "approved unauthorized" temporary encampments, that, in turn, attracted petty traders and artisans. From time to time during 1958-69, all were ordered evicted and moved to new temporary sites or one-room tenements. Meanwhile HBEs sprang up through-out the city

and led to bylaws, prohibitions, and confiscations because the master plan was being spoiled. An observer, Madhu Sarin, however, concluded that "incremental improvement of dwellings depends heavily on the household's ability to sustain and improve its income. For this purpose, the multi-use of dwellings for petty trading, small industry, etc., must no longer be banned, and income opportunities must be encouraged within resi-dential areas" (Sarin, 1978a, page 20; 1978b). Similar rigidities among planners with power have been observed elsewhere, for example in Brasilia and Ciudad Guyana, Venezuela (Peattie, 1979, page 1020; see also Turner, 1976).

In Singapore and Hong Kong, however, architects and planners learned to blend space for working with that for living. Ground floors of apart-ment buildings are reserved for use as workshops and stores. Enterprises that do not generate excessive noise, fumes or fire hazards can rent space in "flatted factories" within apartment blocks (see Winpenny, 1977 and sources cited there).

Concern for the capital-saving, capital-generating potential of HBEs should have revived with the stress on the "informal sector" that began in the early 1970's, notably with an ILO "employment strategy mission" to Kenya (Hart, 1971/1973; ILO, 1972). By then, given factor-price distortions, it seemed obvious that only a minority of urban adolescents and rural migrants could find work in modern factories, offices, and stores and that the rest had to create their own jobs in selling, delivering, repairing, handicrafts, and a wide variety of small-scale services. To call these workers underemployed, transitional, and marginal seemed unrealistic when, in fact, the jobs were proliferating rapidly, perhaps outnumbering formal work. The best strategy was to roll with the punch, to deny that these activities were only marginally productive, and to assert, rather, that they were

"economically efficient and profit-making . . . a source of Kenya's future growth" (ILO, 1972, pages 5, 505).

Numerous studies of cities and industries followed -- case histories, cross-sectional measures, symposia, and surveys of the literature (Bromley, 1978; Bromley and Gerry, 1979; Farbman, 1982; Sethuraman, 1981; Moser, 1984). Much of the discussion was taxonomic with a view toward empirical practicality. Did the informal sector simply consist of the self-employed, of enterprises too small to be enumerated in national statistics, or too invisible to be subject to license and labor legislation, hence "unprotected?" No clear boundary could be found, and Hernando de Soto of Peru concluded with much publicity that "informal" simply meant "illegal" (de Soto, 1983, 1984, 1985).

Many of the characteristics, constraints, and possibilities of the sector were analyzed but not its location and the special advantages of family operation. From one-third to two-thirds of informal sector enterprises were admittedly home-based and family-operated but, if anything, that was treated as an odd drawback that should not be held against the sector.

An extreme example was Herbert Schmitz, Manufacturing in the Backyard (Schmitz, 1982), which despite the title, did not analyze the significance of location. Schmitz thoroughly analyzed much about knitting, weaving, and hammock-making in three Brazilian towns where "virtually all producers work from domestic premises," but the advantages and costs of that location compared with others were ignored. A few writers went even further and excluded value of the space from their measure of capital assets per worker (D. A. Fowler and Gonzalo Jurado in Sethuraman, ed., 1981).

Another strand of work noted the large proportion of dwellings that have businesses but was more concerned with urban patterns than with the viability of the HBEs compared with larger modern enterprises (Stokes, 1978; Mangin, 1967 and 1970; Dasgupta, 1973; Vernon-Jackson, 1960). Along the main roads of some Southeast Asian cities virtually all structures were "shophouses" with businesses on the ground floor and living quarters above (Neville, 1962; Simon and Emrick, 1979). Nevertheless, the prejudice against HBEs continued, especially if that business was subletting or renting rooms to lodgers. One could be evicted from Colombian government-subsidized housing if one committed that crime (Popko, 1980; Solo, 1984; Zorro and Reveiz, 1974 and 1976). A major eight-country study of Asian urban housing, organized by planners, failed to raise the controversial topic of private landlords at all (Laquian and Yeh, 1979).

Urban Sectoral Models

A number of writers have seen that the improvement of housing and better employment opportunities for the poor need not proceed on separate tracks. Among these are Peattie (1979, 1980, 1981, 1983), Ward (1981), Bender (1980), Shankland Cox (1977), Winpenny (1977), Lloyd (1979), King (1977), Gilbert (1982), Edwards (1982), and others. These writers deplore any loss of earning opportunities from regulations and urban layouts that forbid workshops, retail stores, renting rooms, poultry keeping, and commercial gardens, losses that might turn independent artisans into dependent proletarians. But none made the issue central to a model of structural urban change. None provided a sectoral analysis in which family-operated home enterprises confront the large-scale formal sector. Small-scale urban economic activities are generally believed to include

only some with productive potential, while others are merely residual "disguised" unemployment, a possibility that has indeed been specified formally (Steel and Takagi, 1978, 1983; Cole and Sanders, 1985). Common traits assigned to the more productive "advanced informal" subsector are that its firms are small but not micro, that its technology is intermediate but not backward, and even that its activities are not carried out in dwellings. To some, HBEs look trivial and unpromising.

An objective of such models is to show that support for the productive small-scale sector will not only raise incomes but even reduce unemployment that might otherwise be generated in the context of Harris-Todaro (1970) rural-urban migration. They state that shifting capital and supporting services to the small-scale (non-dwelling) sector will not initially reduce migration because the discounted streams of expected earnings (plus other benefits minus costs) are kept above those of the rural area. Eventually, however, growing intermediate sector employment, at wages below those previously expected in the modern sector, will lower migration even though unemployment falls. Fewer migrate because the modern sector's share of urban employment will have fallen, lowering the probability of finding work there. Both Steel-Takagi and Cole-Sanders note that if the "intermediate" or "urban-subsistence" sector produces goods and services with an elastic demand (either wage-goods for workers or inputs for the modern sector), then rural-urban migration can raise the general welfare.

These models retain the conventional view that dualism and misallocation of resources is essentially due to protected high wages and cheap access to capital and foreign exchange by the modern sector. Except for the consequences of such factor-price distortion, little qualitative difference exists between the two sectors. What is small and viable is in transition

toward large and modern status, "with all the rights and privileges pertaining thereto."

It appears that only Michael Lipton has stressed, as we do here, that home-based, family-operated enterprises are qualitatively different, and the core of the informal sector because of two traits -- the dwelling and the family -- the sector's unique weapons against the power of the modern formal sector. These two explain why the sector has survived so well. But unlike our position here, Lipton is pessimistic about the future of urban HBEs and would concentrate further support on rural, informal non-farm enterprises (Lipton, 1980/81).

Lipton's concept of "extended fungibility" (EF) is close to the Becker household models discussed above. What matters about the informal sector is not simply that it is easy to enter, unregulated, small-scale, competi-tive, and labor-intensive, although all that is true. Most important is "EF" or the ease of shifting labor, funds, equipment, materials, and space from one use to another, even from market production to family growth, to housing repair and expansion. Search and transaction costs are low. The formal sector enterprises have greater capital accumulation, more technological change, and economies of scale going for them; but these very traits make for rigidities that hamper the large in the face of unexpected economic change.

According to Lipton, two other forces nevertheless work against the EF advantages of urban HBEs, one demographic, the other political:

> City-center density increases and land gets scarcer and dearer. . . . This process . . . steadily raises costs -- of transport, goods at retail, and access to customers and suppliers -- for [HBEs] relative to [Formal Sector] competitors . . . floor space per person is probably much less . . . These features,

> plus the growing congestion and unpleasantness . . . creat[e] an image of urban [HBEs] as inevitably the home of small enterprises near the verge of failure. (Lipton, 1980/81, page 222)

The other force is political, the formal sector's attempts to hamper HBEs through "separation of home and workplace (either through general zoning or through prohibiting specific activities, such as poultry-keeping near the home, so that the gains of capital EF are largely lost" (Lipton, 1980/81, page 224).

The obvious answer would be to cease such prohibitions and to lower the cost of urban space and transport with infrastructure investment, plus credit and other support for HBEs. Lipton rejects this answer on the grounds that it would prejudice the rural HBE sector, which "would be more promising because it can make better use of (rural) integrated home/workspace, and can fall back more readily on (agriculture) self-provisioning if market demand slackens" (Lipton, 1980/82, page 227).

Why one has to choose sides so categorically between rural and urban HBEs is not clear. If the urban HBEs are destined to be around for many decades anyway, especially in activities where their comparative advantage is great, as the next sections will show, then why not help <u>both</u> sectors, equating at the margin with available resources and doing as much as is politically realistic? In this connection one should note that Lipton himself cites recent work by Suzanne Berger and Michael Piore (1980) as important. These authors claim that even in industrialized countries, specifically France and Italy, an urban HBE sector has a continuing major poitical and economic role because of the very flexibility and fungibility that it has and that society needs because of uncertainty. The sector is neither disappearing nor in transition to modernity because it is needed and viable as it is (pages 98-108).

Two Models with HBEs

The advantage of a home-based enterprise is that is allows flexible scheduling of activities, gives a productive outlet for household savings through multiple use of dwellings and their sites, saves the expense and time of traveling to work, provides convenient access to some markets, simplifies child care, and gives the satisfaction of working for oneself. HBEs have flexibility, convenience, security, sociability, and dignity. As we shall see, many workers are content to be paid about half as much per day to work there.

In poor countries almost any product or service in local demand will be produced in someone's home or on the adjacent site, perhaps in a shed. Over time the urban employment share of HBEs will fall from about a third to less than five percent, but that process can take a century. The urban household income shares generated by home businesses will be half as much as employment, given the lower earnings and greater preference for working at home. The share of HBE income and employment in the informal, small-scale, unregulatled, unmeasured, or whatever sector cannot be stated clearly since no one agrees on the boundary or definition of this compelx of activities, as described above. Most surveyors of the literature seem to put the share of HBE enterprises in the informal sector between one-third and two-thirds (Bromley, 1978; Sethuraman, 1981; Moser, 1984), depending on place and definition, as mentioned above.

All definitions have some arbitrary element, but at least for HBEs the line is comparatively objective. Either the enterprise operates on the site of the dwelling, or it does not. Much informal transport, street-selling, and construction is therefore excluded although it may indeed be part of the family mode of production. For the vast majority of those who work in HBEs,

it is a full-time occupation, requiring no further arbitrary defining. In our Lima, Peru, survey (1983) of 1,706 HBEs we found that 93.5 percent of workers "usually or always" worked in the business. This large share applied not only to the 92.9 percent of HBEs that had only one or two workers, but equally to all the rest.

More data from our Peruvian and Sri Lankan surveys will be presented after suggesting with two simple models that HBEs will be around for a long time but could, nevertheless, play a bigger role. Both models are limited to two sectors, called HBE and formal (FS). Both models stress that dwelling space is the unique input of HBEs and that workers will prefer working there to a point of lowering wages and productivity to half the formal sector level. Model A has two Cobb-Douglas production functions with dwelling space as an input for the HBE sector. Model B is a direct approach with the relative price of dwelling space per square meter as an independent variable. Detailed specifications are in an appendix. With plausible assumptions about the parameters, both models suggest that a generation or two will elapse before the share of the labor in HBEs will fall by half in cities of the developing world. Meanwhile, their absolute number can rise for a long time. Survey data are consistent with these inferences and show also that the composition of HBEs will change over time and is responsive to policies.

Growing density of settlement and the chance for higher productivity and earnings through economies of scale and capital accumulation in FS cause the decline of HBEs. Households abandon their HBEs because their low relative yields do not justify the space they need. Higher density of settlement in larger cities, hence greater scarcity of land, mean higher investment in less space of rising cost per square meter, often at the very

time that savings can be shifted into pensions, insurance policies, or other instruments provided by an improving capital market. These markets shift resources from home workshop space to the formal sector with its scale economies and technological advances. Productivity and labor earnings thereby rise in that sector and increase the opportunity cost of working at home. But as Webb has noted, growing skills, cash registers, better sewing machines, oxyacetylene welders, and a variety of hand tools "add up to a quiet revolution in small-scale business" (Webb, 1977, pages 41, 93). By closing the most inefficient home businesses, the remaining ones will still be half as efficient as the improved modern sector.

In Model A relative amounts of technological change are shown in the upward shifts of Cobb-Douglas intercepts, A and B. The HBE and FS sectors use homogeneous labor, N_h and N_f, to produce a homogeneous output, X_h and X_f. The only other inputs are dwelling space, S_h, for the HBE sector and capital, K_f, for the formal sector. No economies of scale are assumed for the time being, and the output elasticities, as can be seen in equations (1) and (2) are α, $1-\alpha$, β, and $1-\beta$.

$$X_h = AN_h^{\alpha} S_h^{1-\alpha} \qquad (1)$$

$$X_f = BN_f^{\beta} K_f^{1-\beta} \qquad (2)$$

These equations can be differentiated partially with respect to employment, thus yielding the marginal product of labor, hence the wage, as can be seen in the appendix. The critical assumption is that, as relative productivities tend to change because of technological advances, capital accumulation, and the rising scarcity of space, workers shift from the HBE

sector to the formal sector to keep the wage ratio an unchanged amount, say, 50 percent. Marginal home businesses are discontinued.

The reduced form equation (3) tells how big the capital stock in the modern sector must be in order to attain an FS/HBE ratio of employment, $NR = N_h/N_f$, with a wage ratio, $WR = W_h/W_f$, that remains at 50 percent. For the sake of simplicity the output elasticities are assumed to be equal, $\alpha = \beta$.[2]

$$K_f = \frac{S_h}{NR}\left[WR\frac{B}{A}\right]^{\frac{1}{1-\alpha}} \qquad (3)$$

Such an equation can show how long it will take before enough capital has accumulated so that HBE employment will have fallen from, say, a third, to a sixth of the labor force. Suppose that all variables and parameters remain the same including space per home worker, S_h/N_h, except that the labor force grows at 4.4 percent annually and the capital stock at 5 percent.

Before enough capital has been accumulated, 37.6 years must elapse. By that time, an initial labor force of, say, 300,000 workers will have quintupled to 1.5 million. The numbers in the formal sector will have risen from 200,000 to 1.25 million. But those in the HBE sector (together with complementary space, as assumed) will also have grown at an annual 2.5 percent, from 100,000 to 250,000 workers.

In reality, the HBE share of workers (as well as those in a non-HBE informal sector) may actually grow if factor markets are fragmented, or if capital accumulation lags or is misallocated to unduly favored capital-intensive activities. In many LDC cities that is the pattern that has actually occurred, especially as economic growth has slowed in the past

decade. The example of Lima, Peru will be discussed in further detail below (Chavez and Bernedo, 1983; Webb, 1977; Wendorff, 1985).

On the other hand, if capital grows well and is not misallocated, but dwelling space per household is allowed to become scarce due to poor urban policies, then HBEs will be deprived of a major input and will fall in productivity, wages, and employment share. Assume the labor force keeps growing at 4.4 percent and the formal capital stock at 5 percent annually. If the space per home business worker now falls from an index level of 100 to 80, then the HBE employment share will fall by half in only 33.0 years. In either case, since HBEs will be spread throughout a larger area in accordance with the locational advantages of particular types, the number will not include many of the original enterprises, but we leave that issue for later.

A few amplifications can be made. For example, if technological or organizational changes lift the production functions at rate θ for the home business sector, and at rate $\emptyset$ for the formal sector, then B/A in equation (3) must be multiplied by $e^{\emptyset t}/e^{\theta t}$ where e is the base of natural logarithms. A variety of different outcomes will also result if one changes assumptions about the output elasticities, or if one assumes that the acceptable wage differential between the FS and HBE sector rises or falls.

Model B is a direct approach that omits specifying underlying production functions with their somewhat dubious and possibly irritating assumptions. B focuses on the immediately relevant independent variables: The earnings ratio, WR, and SPR, the ratio of the price of space to other prices. Each of these, multiplied by parameters, a and b, determine the employment ratio, NR:

$$NR_t = aWR - bSPR_o e^{pt} \qquad (4)$$

The subscript $_0$ refers to the initial period, and t refers to the final period. Compared with other goods, the price of dwelling space rises at rate of p. The share of HBEs in employment will be higher if earnings in that sector are higher, but lower if the price of space is relatively high.

Let us estimate once more how long it would take for the employment ratio to fall from 1/3 to 1/6. Assume again that WR remains at 1/2 (that one has to pay workers twice as much to induce them to leave their HBEs). Assume that the coefficient a = 1.0, and that b = 0.2, an approximation of the share of income that families spend on dwellings. Suppose that p = 2.0 percent.

Substituting all that in equation (4) and solving for t we find that 28 years are needed for the HBE share in employment to fall by half. If the decline is to take 37.6 years, as in the earlier illustration, then p must be only 1.5 percent. A p growth rate of 4.0 percent will shrink the HBE share to half in 14 years. One can change the specifications in a number of plausible ways, but the high sensitivity of home employment to the cost of space remains clear.

Findings from Peru, Sri Lanka, and Zambia

These models help as much as the assumed can opener helped toward piercing the real can on that desert island. They may clarify the questions but don't give the answers. To learn more about actual HBEs, empirical studies are needed, and we therefore made a preliminary survey in Lusaka, Zambia, in 1979, followed by more elaborate ones in Lima, Peru, in 1980 and 1983, and in Colombo and Kalutara, Sri Lanka, in 1981 and 1983.[2, 3]

Are HBEs in these cities productive, perceived as desirable by their operators, and sensitive to the cost of space? What is their share of employment and their contribution to urban household income? Does their share decline but so slowly that actually HBE numbers proliferate? How is the changing composition of HBEs related to their competitiveness with the modern sector in terms of fungibility, use of space, and location?

In general, our surveys gave answers to these questions that were in line with the analysis given so far. Home enterprises were more wide-spread in poorer and smaller cities and more likely to be in manufacturing there, the activity that eventually faces the most competition from scale and capital formation in the modern sector. Speculation about trends is unjustified on the basis of three or four places; but for what it is worth the HBE employment share in Lima was half that of Kalutara and household incomes were 2.2 times as high. If an annual 2.0 percent income growth rate separates the two places, then the implied time needed for the HBE share to fall by half is 40 years. The objective in choosing Colombo, Kalutara, Lima, and Lusaka, was not, however, to prop up such claims, but research convenience and cultural, demographic, and economic variety.

The survey of Lusaka was limited to peri-urban settlements and found that a quarter of dwellings had home enterprises that raised household income by 10.7 percent above those without HBEs in dwellings that were 31.8 percent larger. The survey of conventional (not peri-urban or squatter) neighborhoods of Colombo also found a quarter with home businesses, and these raised income by 10.3 percent in dwellings that were about the same size as others (Ndulo, 1982; Gunatilleke, 1983).

The main surveys, however, were conducted in Kalutara and Lima in late 1983. Few places could be more different -- even without noting culture and

history. One is an immense capital city on an arid coastal plain, the other is a rural town of thirty-two thousand in a double-monsoon zone of rubber plantations. In recent years, Lima has had a high rate of popula-tion growth that has slowed from 5.4 percent during 1961-1972 to an annual 3.8 percent, while the growth of Kalutara has not exceeded 1.8 percent. Differences that relate home businesses to the rest of the urban economy can be seen in Table 1. Note that employment shares are twice as high as income shares in both cities (lines 4 and 5). The HBE income per worker is absolutely and relatively higher in Lima, but the share that HBEs contribute to household income in Lima is lower (lines 7 and 8).

Among other differences that one might readily expect between Lima and Kalutara is the much lower density of settlement in the smaller town. Houses with an average floorspace of 83 m^2 stood on lots that were nearly seven times as large, 562 m^2. Naturally agricultural activities could be carried out on many more of these than on the dry 149 m^2 lots of Lima with their 116 m^2 dwellings, a large proportion of them multi-storied.

Urban facilities were less adequate in Kalutara where only 16 percent of households had indoor piped water (from their own wells), and 80 percent obtained water directly from wells. In the absence of a public water or sewer system, the best sanitary facilities were the water-sealed toilets of 40 percent of the population. By contrast in Lima, 73.0 percent had indoor piped water, and 62.5 percent had a sewerage connection in 1980.

With the lower rate of population growth, the average household in Kalutara had occupied its dwelling 28 years, over twice as long as households in Lima, 12.7 years. Many more had inherited houses from parents and grandparents. The average age of home businesses is also more, eight years, compared with 5.4.

Table 1. The Role of Home-based Enterprises in Income and Employment Generation in Colombo and Kalutara, Sri Lanka, and in the Metropolitan Area of Lima, Peru

	Colombo Metropolitan Area, Sri Lanka (1981)	Kalutara, Sri Lanka (1983)	Lima Metropolitan Area, Peru (1983)
1. Population	1,434,000	31,500	5,258,000
2. Household annual income per capita, US dollars[1]	$164	$170	$376
3. Share of households with a business in the dwelling or on the site, percentage of all households	17.0	12.3	10.8
4. Home business workers per household with one or more such businesses	2.8	2.2	1.4
5. Urban employment share of home businesses, percent	28.0	16.2	7.4
6. Urban household income share that is generated by home businesses, percent	12.5	9.2	4.5
7. Income per home business worker as a percentage of income of other workers	36.7	52.4	52.6
8. Share of household income that is generated by the home business(es) for the households that have one or more, percent	54.0	45.8	39.9
9. Sample size of the home business survey	154	131	1,706

Sources: Surveys described in Note 2 and national census data projected to the dates of surveys.

Note: [1]US $1.00 = 20.15 Rupees, 1981; 25.00 Rupees, 2,000 Soles, 1983.

Earnings, Employment, and Preferences

Given these differences, similarities among HBEs are striking. The average HBE net monthly income (combining returns to capital and labor) was $70.3 in Lima and $69.9 in Kalutara. An average of 1.4 workers was employed in Lima, and 1.5 workers from the household in Kalutara, plus 0.7 others, making earnings per worker lower. Greater HBE employment was also generated in Kalutara because one in nine dwellings had one or more HBEs, compared with one in eight in Lima (Table 1 line 3).

In both cities earnings per HBE worker were about half of what workers from these households earned if they had outside jobs. In Lima HBE workers from our sample earned $50.2 monthly, which compares with $49.8 monthly for workers in the "non-structured" sector generally, as found by Ministry of Labor surveys in late 1983. "Structured" sector workers earned $95.3. In Kalutara home workers earned $42.9 monthly compared with $91.4 for others.

Although earnings were only about half of that in outside work, the vast majority of workers seemed to accept that differential as reasonable. In Kalutara more than 80 percent would require a higher wage to switch employment, and more than 60 percent of home workers considered an HBE inherently superior to wage or salaried employment. Over half thought just for earning the equivalent income on the outside, at least an additional hour would have to be spent working and traveling, and 38 percent thought an extra three hours or more would be needed. Only 13 percent perceived their competition as coming from larger firms, and 56 percent thought they had no serious competition at all. The remaining 31 percent thought it came from other small firms.

In Lima the larger sample (1,706 observations) allowed a more detailed analysis of responses. The percentage saying an HBE was better than work

in "a factory or some other large organization" was 74.8 percent, with 53.0 percent saying it was "much better." Note in Table 2, Column 1, that the three types of HBE operators who most preferred their HBEs were sub-contractors who sold to other businesses. Two thirds of them believed they had it "much better," although their monthly earnings, while high, were not the highest among HBEs. Petty commodity theorists have considered these enterprises the most miserable and exploited when it would appear, rather, that the laundresses (line 18) are in that category.

In Lima 42.5 percent believed that a formal sector job with no more pay would require at least an additional three hours of time, and to justify the switch, 71.0 percent said the income differential would have to be not just more, but "much more." Only 14.9 percent thought competition came from larger businesses not in dwellings, and only 10.6 percent were thinking of closing their business. Among these were 43.5 percent of landlords who rightly felt that rent control did not allow sufficient rent increases to compensate for inflation. Among the rest, only 5.7 percent were thinking of moving their businesses out of their dwellings (see Table 2, Column 6).

As an interim conclusion, we can say that home enterprises are important to an urban economy because a tenth to a quarter of households have them and because their operators and workers are in general content with their earnings compared with alternative opportunities. To distinguish those HBEs that are most viable and promising from those that are marginal, doomed, and perhaps exploited, a disaggregated look is needed. Policy must be adapted to these variations.

Table 2. Lima, Peru, Incomes and Perceived Advantages of Home-based Enterprises, 1983

Enterprise type (number in sample)	(1) Monthly home business income (dollars)	(2) Standard error of (1)	(3) Percent saying a home business is "much better" than a formal sector job (%)	(4) Formal Sector job would take 3 more hours daily or more including travel (%)	(5) To change, formal sector wages would have to be "much more" (%)	(6) Not thinking of moving business from dwelling (%)	(7) Thinking of closing the business (%)
MANUFACTURING (472)							
I. Food products, textiles, clothing (332)							
A. Female operated (267)							
1. Market in neighborhood (103)	33.1	4.5	48.1	41.5	66.7	96.0	9.0
2. City-wide market (139)	52.0	11.9	55.6	44.7	80.8	93.5	15.0
3. Sell to business (25)	77.4	18.6	69.9	26.7	53.5	90.0	0.0
B. Male operated (65)							
4. Market in neighborhood (20)	112.4	25.3	59.3	61.2	69.4	100.0	4.1
5. City-wide market (30)	166.5	13.0	41.3	39.8	67.2	87.7	2.6
6. Sell to businesses (15)	106.2	8.6	45.8	38.4	94.3	71.4	0.0
II. Leather, wood, and metal products (92)							
7. Market in neighborhood (29)	73.5	13.5	50.8	58.1	65.6	94.1	5.9
8. City-wide market (39)	128.7	12.1	61.2	43.8	64.6	95.6	2.2
9. Sell to businesses (24)	111.0	5.0	72.3	41.5	79.2	93.1	12.0
III. Other manufacturing (48)							
10. Market in neighborhood (12)	24.4	8.2	28.4	36.8	60.0	100.0	0.0
11. City-wide market (25)	57.3	20.3	55.0	46.5	74.9	91.7	23.2
12. Sell to businesses (11)	128.7	2.4	62.8	40.5	55.4	100.0	7.4
SERVICES (1,234)							
IV. Retail trade, restaurants, bars (898)							
13. Market in neighborhood (754)	56.4	27.2	54.2	38.7	70.4	95.3	9.9
14. City-wide market (144)	151.8	11.4	48.4	46.6	68.4	93.7	11.1
V. Other services (336)							
15. Repairs (59)	104.2	3.7	58.2	45.3	78.8	98.6	12.5
16. Medical for neighborhood (56)	23.8	33.2	39.6	51.4	82.2	98.5	11.4
17. City-wide medical (14)	70.7	5.7	17.3	62.7	47.4	88.4	5.8
18. Laundries and cleaning (23)	32.5	5.1	30.3	57.0	71.3	100.0	16.0
19. Lodging (71)	52.8	8.1	56.8	42.9	63.5	---	43.5
20. Miscellaneous (113)	62.7	3.6	60.2	47.6	70.6	86.2	16.9
TOTAL (n = 1,706)	70.3	7.7	53.0	42.5	71.0	94.3	10.6

Source: Survey of 1,706 home businesses, October 27-December 10, 1983; for details see Note 2.

Place, Gender, and Surviving

Home-based enterprises that perform best and survive are those with a comparative advantage with respect to the modern sector, ones that can exploit the fungibility of their labor force, of available space, and of location. The categories of Table 2 have been set up in part with those criteria in mind. An HBE type is not simply defined by the product or service it provides. Instead, it should be conceived as a holistic entity that involves the operator (male-female, head-spouse-other), the market (neighborhood, city-wide sales, subcontracting to business), and the location (conventional, inner-city, irregular settlements, or popular urbanization). To bring these elements out and yet avoid excessive sample fragmentation, some product categories have to be combined: leather, wood and metal products as "sturdy" predominantly male-made goods; food-products, textiles, and clothing as "light" and either male- or female-produced, etc. Since 52.6 percent of the Lima sample consisted of retail stores and cafes, a detailed analysis of those enterprises could be carried out separately (Strassmann, 1985).

When home enterprises are classified as in Table 2, a few patterns about their relative incomes stand out (Column 1). Enterprises that sell only in the neighborhood ("this and nearby streets") generally have much lower incomes than those that sell city-wide or to businesses. However, these two-thirds of neighborhood-selling home businesses are mostly stores and cafes run by women. They may seem marginal but in the remote locations where they are, switching to sewing or baking would have reduced income by more than half, from about $40 monthly to $19. Another striking pattern from Table 2, lines 4-6, is that when men operate food, textile, and clothing workshops, the HBEs earn over three times as much as when women do

(except for 15 subcontractors), and these workshops even earn more than HBEs in the male-dominated branches of leather, wood, and metal products.

More than half of the HBEs in manufacturing in Lima, 55.7 percent, made clothing. Their monthly income of $58.2 was lower than that of other manufacturing types, but about the same as miscellaneous personal and social services. Monthly earnings per worker were only $46.2, less than the $51.9 of personal services. Like such services, only a fifth of these HBEs was operated by the male household head, compared with a quarter for others. Nevertheless, the high shares of clothing producers considering their HBE "much better" than outside work (54.9 percent) and requiring "much more" pay to switch to such work (72.2 percent) were proportions typical of the sample as a whole. In a detailed study of the Lima clothing industry, Reichmuth (1978, reported at length in Moser, 1984, and confirmed by de Soto, 1984), found that very small informal clothing producers are very competitive with formal sector firms, both large and small: the "average earnings of a substantial part of informal clothing producers were about that of an equivalent activity in a formal sector job at its start" (Reichmuth, 1978, page 147). Reichmuth's work in turn confirmed that of Orlove, who found that tailors and shoe makers in southern Peru were most likely to do subcontracting work at home, while other artisans often rented shops to work elsewhere (Orlove, 1974).

In Kalutara it was also true that women predominated in making textiles, clothing, and food products; and their income of $43.2 monthly was less than half of the $92.3 earned by HBEs run by a male household head. In Kalutara, moreover, the third of all HBEs that were located in middle or high-grade neighborhoods earned 54 percent more ($78.4 monthly) than those in other neighborhoods ($50.9). Such complexities can only be

sorted out by multiple regression analysis, as shown in tables 3 and 4. Independent variables are limited to those included in our survey instruments and most relevant for the purposes of this analysis.

The regressions suggest that where and to whom an HBE sells, as well as which family member runs it, is at least as important as the actual service or product made. In Lima nothing brought HBE income down as much as having a business that sold mainly to low-income neighbors (Table 3, line 3). But in far-out irregular settlements, pueblos jovenes, with poor access to the rest of the city, other opportunities were too unproductive or too costly. At the same time, however, lack of access gave some protection against outside competition. In "popular urbanizations," also far out but provided with adequate infrastructure, HBEs were more productive (line 5). Household incomes in those areas were also higher, averaging $200.7 monthly, compared with $153.0 in pueblos jovenes in 1980 (Strassmann, 1984c, page 746).

If a female household head or spouse instead of a male head operated the business (as was true in 55.7 percent of cases), income was likely to be $51.2 less per month, other things given (Table 3, lines 1 and 2). Among various factors, this difference reflects the inferior opportunities for women with respect to competing jobs in the formal sector, discrimination in dispensing credit, and a variety of traditions, including greater responsibility for child care and housework. Only women were willing to take the worst-paying job of all, being a laundress.

Once the characteristics of location and the gender of the operator have been allowed for, the ranking of HBEs according to income is actually

Table 3. Lima, Peru: Income as a Function of Home Business Characteristics: Regression Coefficients from a Sample of 831 Units with Separate Space for the Enterprise, 1983

	(1) Income per home business	(2) Income per worker	(3) Percent of sample in category
1. Male household head runs business	27.6** (12.3)	18.2*** (6.7)	24.4
2. Female head or spouse runs business	-23.6** (11.9)	-3.7 (6.4)	55.7
3. Sales mainly to low-income neighbors	-75.9*** (13.3)	-32.9*** (7.2)	57.1
4. Sales mainly to businesses	-9.7 (20.8)	-15.6* (11.3)	4.4
5. Located in popular urbanization	47.1*** (15.6)	22.8*** (8.4)	20.2
6. Located in pueblo joven (irregular settlement)	21.8 (14.9)	7.8 (8.2)	41.3
7. Located in old subdivided mansion or callejon substandard housing	8.8 (22.0)	16.9 (11.9)	12.3
8. Education of operator, years of formal schooling	2.4*** (0.9)	2.0*** (0.5)	
9. Floorspace used by the business, m^2	0.15*** (0.05)	0.04 (0.03)	
10. Retail store, cafe, restaurant, or bar	54.0*** (11.2)	24.4*** (6.1)	52.6
11. Wood, leather, or metal products	17.0 (18.1)	6.3 (9.8)	5.4
12. Textile, clothing, or food products	31.2** (16.1)	9.4 (8.7)	19.5
13. Manufacturing other than 11 and 12	-25.0 (34.4)	-17.8 (18.6)	2.8
14. Constant	55.7*** (17.1)	35.1*** (9.2)	
15. Adjusted R square	.124	.091	

Source: Survey of 1,706 households with home enterprises in the Lima Metropolitan Area, October 27 to December 10, 1983. Only 831 households with a single enterprise and using some space exclusively for the business are included here. See Note 2.

Note: Regression coefficients (except for floorspace and education) apply to dummy variables that are 1.0 if the condition is present and otherwise 0.0. Standard errors are in parentheses. Significance at the .01, .05, and .10 level are given by three, two, or one asterisks, respectively.

Twenty-one home enterprises sold services (other than retail trade, food, or drink) to neighbors and others in middle or high income districts and were operated by someone other than the male or female head or spouse. If that person used the average amount of floorspace and had the average amount of education, monthly home business income is implied to be US $77.4 or $50.2 per worker. Regression coefficients imply how much income would vary from that with each condition. The education coefficient must be multiplied by the number of years different from the mean of 6.83 years. Mean floorspace was 35.4 m^2. Mean home business income of this sample was US $87.5 or $58.9 per home worker.

The residual percentages were: neither male or female head or spouse -- 19.8 percent; sales to middle or higher income consumers throughout the city -- 35.6 percent; located in conventional, standard residential area -- 26.2 percent; producing a service other than retail trade, cafes, or renting rooms -- 15.5 percent; renting rooms or apartments -- 4.2 percent.

Table 4. Kalutara, Sri Lanka: Income as a Function of Home Business Characteristics: Regression Coefficients from a Sample of 113 Enterprises, 1983

	(1) Income per home business	(2) Income per worker	(3) Percent of sample in category
1. Male household head runs business	39.1 (27.8)	15.9 (15.8)	44.6
2. Female head or spouse runs business	12.6 (30.9)	20.3 (17.5)	28.4
3. Sales mainly to neighbors	2.0 (25.7)	-14.9 (14.5)	60.7
4. Located in middle or high grade neighborhood	71.9** (25.7)	25.5* (14.5)	33.0
5. Education of operator, years of formal schooling	0.1 (4.0)	0.9 (2.3)	---
6. Age of the enterprise	0.8 (1.0)	0.1 (0.6)	---
7. Floorspace used by the business, m^2	0.44** (0.19)	0.27** (0.10)	---
8. Retail store	17.4 (26.9)	8.1 (15.2)	29.2
9. Textile, clothing, or food products	5.7 (34.8)	-16.8 (19.7)	19.2
10. Other manufacturing	135.3** (35.2)	26.4 (19.9)	12.3
11. Constant	-15.3 (52.6)	15.9 (29.8)	---
12. Adjusted R square	0.217	0.112	---

Source: Survey of 130 households with home enterprises in Kalutara, Sri Lanka, November 17 to December 15, 1983. With a population of 31,500 Kalutara was located 25 miles south of Colombo at the mouth of the Kalu River. Twenty-two percent of home businesses were interviewed as a random sample. Landlords and cases with incomplete information were excluded from the regression. See Note 2.

Note: Regression coefficients (except for floorspace, education, and age of the business) apply to dummy variables that are 1.0 if the condition is present and otherwise zero. Standard errors are in parentheses. Significance at the .01, .05, and .10 levels are given by three, two or one asterisk, respectively.

The base enterprise is one operated by someone other than the household head or spouse, is located in a low-income or mixed neighborhood, sells to customers mainly from outside of the neighborhood, and produces a service or product other than retail trade or manufactured goods. If such a hypothetical enterprise had the average characteristics of 31.9 m^2 of floorspace, 8.6 years of opeation, and an operator with 8.9 years of schooling, the regression would imply an average income of only $6.5 monthly or only $1.6 per worker. The figures have little meaning except as a base for using coefficients in the table. For example, a male-operated, "other manufacturing" firm in a better neighborhood would have net earnings of $252.3 monthly.

reversed. Retail stores, snack bars, and the like turn out to be better than manufacturing; and within manufacturing, textile, clothing, and food products turn out to yield more than other types (Table 3, lines 10-13). Tokman (1978) and Lipton (1980/81) have pointed out the comparative advantage and high fungibility of home-based retail stores. Nevertheless, if they sold only within neighborhoods, instead of city-wide, these retail earnings fell to a third; if they were operated by women, earnings fell by half; and if both, by women and only in neighborhoods, earnings fell to a sixth (compared with a male-operated HB store selling city-wide). Still, as in Santiago, Chile, these shops have been able to withstand and even to push out supermarkets (Tokman and Souza, 1976; Tokman, 1978).

A comparison of Lima with Kalutara confirms the hypothesis that manufacturing (other than textiles, clothing, and food products) is most vulnerable to the capital- and scale-based advantages of the modern sector. In Kalutara 31.5 percent of HBEs were in manufacturing, compared with only 27.7 percent in Lima. Within manufacturing, Kalutara incomes were also significantly higher if something other than textile, clothing, or food products was produced (Table 4, line 10). In these activities (12.3 percent of all HBEs) monthly income averaged $196.6. If it were not for them, the overall Kalutara HBE income average would have been $52.1, substantially below (not about equal to) the $70.3 Lima average HBE income. In Lima such "other manufacturing" HBEs were only 8.2 percent of the total, and their monthly earnings averaged only $92.6. HBEs in "other manufacturing" in Lima also feared that competition from large businesses was twice as likely (30.1 percent) as the average HBE operator believed (14.9 percent). "Other" manufacturing includes printers, makers of signs or paper products, chemicals, plastic or rubber goods, jewelry, toys,

sporting goods, musical instruments, lampshades, artificial flowers, and umbrellas. In a sense, these were the remains of what had been displaced by the modern sector. Note that the HBE manufacturing share in Colombo, Sri Lanka, was 31.2 percent (almost exactly that of Kalutara), and that the share of "other" manufacturing was also about the same (Gunatilleke, 1983, page 98).

Business Space in Dwellings

This article began with a stress on the capital-saving, capital-generating advantages of using space in dwellings for production, so perhaps we should also conclude with that. Table 5 shows that a large percentage of HBE operators said that (1) "If I did not have the business in this dwelling (or site), the business would not exist," and (2) "Without the home business, I could not afford to live here."

Table 5: Mutual Dependence of Dwellings and Home-based Enterprises on One Another, Lima, Kalutara, and Colombo

City (year)	Percent of Respondents		Sample Size
	Need dwelling to operate enterprise	Need home enterprise to afford dwelling	
Lima (1983)	70	68	1,706
Kalutara (1983)	69	53	131
Colombo (1981)	75	44	154

Many HBE activities use a room or two exclusively, while others go on in the same space as domestic life. Exclusive space tends to be used if

the activity provides lodging, involves bulky equipment or materials, and if customers are likely to come often and stay a while. In Moslem countries, high preference for privacy makes use of exclusive space or even moving businesses that are normally HBEs out of dwellings a strong tendency (Davies, et al., 1984).

The extra capital invested in exclusive space partly explains the higher gross incomes in those activities and the low incomes of some handicrafts that can be started easily in the corner of a room. Among these was most of the garment making, fabrication of paper flowers, and the like. Such enterprises were most likely to be new and, by implication, short-lived. In Lima 48.7 percent of enterprises used some dwelling space exclusively; in Kalutara the share was 60.0 percent. The difference between the cities is largely accounted for by the 9.2 percent share of agricultural enterprises in Kalutara, as one would expect with the lower density of settlement of a small town. These agricultural HBEs produced a variety of goods from poultry and eggs to orchids and other decorative plants. In Colombo only 4 HBEs (2.6 percent) were in agriculture.

Note that in the multiple regressions for both Kalutara and Lima (Table 3, line 9; Table 4, line 7) the amount of floorspace is significantly associated with the level of HBE income. The association is not as strong with HBE income per worker since more space is likely to be filled with more workers. Among the largest HBEs in Kalutara, one employed 18 non-family workers as handloom weavers, and another employed 29 as beedi cigarette wrappers.

In Colombo an interesting HBE employed 23 women in 1981 to make artificial fly fishing lures for export. Each woman made 30 lures per day and was paid the going daily wage of $1.40 which happened to equal the

c.i.f. price per lure. The enterprise was 49 percent owned by a foreign investor and advisor. Monthly gross income was $20,000, and net income was a fifth of that. By 1983, employment had risen to 48 workers.

More typical is the case of the couple who began selling cigarettes, candy, and soft drinks from their home and went on to a variety of groceries and baked goods. They hired two workers, expanded further, bought a taxi cab, and hired a driver. They used the car to bring in supplies, including daily newspapers and over-the-counter medication. On their property a wooden shed with a metal roof was added for $120, and it was big enough to stock $400 of goods.

Another exporting HBE in Kalutara produced small carved and painted masks and figurines. The work of carving was put out to other HBEs, but the final sanding and painting was done by the operator and his wife in their garage. With this income they expanded their house to 160 m^2 of floorspace, including two complete bathrooms, connected to a well with a pump and to a septic tank.

Unlike the officially designed public housing, dwellings in irregular settlements around Lima are laid out in a way that facilitates HBEs. At an early stage a garage is added in front although the household does not expect to be able to afford an automobile for years. As Wendorff (1985, pages 149-150) has put it, "the family workshop or little store in the garage show how the economic function complements the shelter function in housing of the poor" (my translation). Wendorff also notes the prevalence of informal sector businesses in rented dwellings and other rented premises, and attributes this pattern to the need to locate close to markets, often in the inner city and in conventional neighborhoods, rather than in the outskirts (page 150). Our survey found the same (Strassmann, 1984d).

A success story in Peru was the woman who inherited a rundown house with a store at a good location. She spruced up the dwelling and made the business a snackshop. It flourished, and with a second converted room became a profitable restaurant. When the family moved out, they made the vacated rooms a bakery, and the business ceased to be an HBE. Meanwhile, bookkeeping had begun, and bank loans were taken out and repaid.

Thirty-seven of the HBEs in our Lima sample of 1,706 had received loans from the Banco Industrial del Peru (BIP), the official institution charged with such lending, partly with funds from the U.S. Agency for International Development. Half of the loans went to manufacturing HBEs, and forty percent to stores and restaurants. The BIP monthly HBE income of $137.7 was nearly double that of the average, and their per worker income of $65.3 was 30 percent above the average. Yet apart from having the loans, the BIP enterprises differed significantly from others in only one measurable respect: amount of space. Area of the site was one-third larger, nearly 200 square meters; and area of the dwelling was twenty percent larger at 139 square meters. Value per square meter of owned BIP dwellings was $74.1 or 63 percent above the average, making total dwelling value still higher, $10,300, compared with $5,600. The extra space not only helped directly in carrying out the business activities but also provided the collateral that made the loans possible (Goldmark et al., 1983; Strassmann, 1984c; Buvinic, et al., 1984).

Conclusion

Since the Industrial Revolution, many complex trends and pressures have determined the employment and output shares of home businesses in urban economies. But two factors stand out: Comparative productivity and

the relative cost of residential space. The aim here has not been to advance one more monocausal theory of development and a simplistic panacea. But since space is usually produced labor-intensively, and since homebased enterprises are themselves labor intensive, yet productive, especially in the entended fungibility sense, concern for employment, income, and housing do go together. High density, above all, raises the price per square meter and, beyond a certain point, makes capital-intensive building methods economically viable. So government should zealously extend roads, drainage systems, water pipes, and sewers to new areas. Without good access to the rest of the city, many types of HBEs cannot be established in more remote areas because they would not be competitive with either the formal sector or with HBEs that remain in central laocations. Apart from urban infrastructure and well-aimed training and credit programs, other HBE support need be no more than permissive. With cheap space, good location, credit, and skills, HBEs according to type, will flourish as long as they should. And no longer than that.

Notes

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[2]What matters is that the term in the brackets of equation (3), and its exponent should be a constant. Norman Obst has demonstrated that this effect can be obtained without assuming that $\alpha = \beta$. One can assume instead that the marginal products (prices) of space and capital are constants. That could be the case if the city were located on a featureless plain with a corresponding pattern of internal transport and business location and if capital could flow in freely at constant prices.

[3]This note explains the sampling methods used in Lima, Kalutara, Colombo and Lusaka. In Lima for both the 1980 and 1983 surveys, house-

holds were selected at random from those in 203 clusters of about 120 dwellings. These clusters had been previously selected by the Directorate of Employment and Migration Studies, Ministry of Labor and Social Progress, in a random stratified manner from 5,900 clusters into which the Lima Metropolitan Area, including the port of Callao, had been divided. In 1980 1,167 households were interviewed during June 10-July 3. Of the initial selection, 266 interviews did not materialize because dwellings had been demolished, were now unoccupied, used entirely for non-residential purposes, or had occupants who refused to be interviewed or could not be located even after four return visits. Added were 53 households to represent unexpected increased density of settlement. Among the final 1,167 households, 132 had home businesses.

To identify a larger sample of home enterprises for the 1983 survey, 15,107 dwellings were selected first in the manner described above. A total of 1,706 households with home businesses were found -- again 11.3 percent, but actually only 10.8 percent with allowance for some stratification to reduce first-stage sampling costs. Since 193 households had two businesses and 7 households had three businesses, the total number found was 1,913. Interviews concentrated on the main home business. This survey was carried out during October 27 to December 10, 1983.

In Kalutara, Sri Lanka, 326 households were selected randomly in accordance with the density of settlement in each census block. As a result 40 households with home businesses were found. A supplementary sample of 91 households with home enterprises was added by interviewing households within a radius of five dwellings from those in the original sample. Interviews were carried out during the period November 17 to December 15, 1983.

The 1981 survey of Colombo was limited to wards in which 50 percent or fewer buildings were business premises. From census lists, 671 households were then selected at random. These lists exclude temporary shacks. Of the 671 households, 154 carried on home enterprises. Interviews were carried out in English, Sinhala, and Tamil during the period June 15 to July 31, 1981. During the period September 1 to November 30, 1983, 40 of the 517 households without home enterprises and 50 out of the 154 households with such enterprises were selected at random to be reinterviewed to determine if new businesses had started or old ones were discontinued, possibly as a result of the Tamil-Sinhalese urban violence of July 1983 (Kalutara has a negligible Tamil population). Completed interviews included 34 households without and 42 with home enterprises. To make estimates for Colombo as a whole, information from other surveys and reports was used (Gunatilleke, 1984c).

In Lusaka 168 households were selected at random in three low-income settlements with different physical characteristics: Kaunda Square, Bauleni, and Chawama. A total of 162 interviews were completed during July and August 1979, but only 157 were suitable for analysis (Ndulo, 1982). Of these, 38 either operated a business or rented out rooms.

[4]Our Lima sampling proportions (see note 3) imply that there were 136,700 home business workers (7.4 percent) in a metropolitan labor force of 1,840,000. In June 1981 the Ministry of Labor estimated that the informal ("non-structured") sector employed 473,400 workers. Extrapolated to November 1983, that number would be 518,000. Informal sector workers therefore appeared to be 28.2 percent of the labor force or 31.0 percent of employment (given 9 percent open unemployment). HBE Employment was 26.4

percent of informal employment. The definition of the informal sector used by the Ministry of Labor was any enterprise with less than 10 employees in manufacturing and with less than 5 employees in other activities. A few occupations such as wholesale merchants, insurance salespersons, miners, bankers, telephone operators, detectives, waiters, models, and others, were automatically excluded, as were employees of agricultural and mining enterprises, makers of plastics, paper products, and machinery. The arbitrariness of these inclusions and exclusions for sampling convenience is acknowledged. Whether it biased results up or down in unknown. The share of employment found in retail trade, 46.3 percent, was close to the 48.5 percent found among our HBEs; but the share found in manufacturing of 20.7 percent was less than the 27.7 percent share among HBEs (Chavez and Bernedo, 1983).

Appendix

This appendix presents Models A and B from the text in greater detail and with some elaboration. With respect to Model A, two production functions apply, using symbols defined in the glossary. Equations (1) and (2) from the text are repeated below:

$$X_h = AN_h^{\alpha} S_h^{1-\alpha} \tag{1}$$

$$X_f = BN_f^{\beta} K_f^{1-\beta} \tag{2}$$

The total labor force is used only in two sectors, HBE and FS, so $N_t = N_h + N_f$. Only the formal sector uses capital K_f, and only the home business sector uses dwelling space, S_h.

Equations (1) and (2) can be solved for employment in each sector. Then one can find the ratio of home to formal employment. A simplifying assumption is that $\alpha = \beta$. Makes everything look much neater.

$$N_h = \left(\frac{X_h}{AS_h^{(1-\alpha)}}\right)^{\frac{1}{\alpha}} \tag{3}$$

$$N_f = \left(\frac{X_f}{BK_f^{(1-\beta)}}\right)^{\frac{1}{\beta}} \tag{4}$$

If $\alpha=\beta$, the employment ratio equals:

$$NR = \frac{N_n}{N_f} = \left(\frac{X_h}{X_f}\right)^{\frac{1}{\alpha}} \left(\frac{BK_f}{AS_h}\right)^{\frac{1-\alpha}{\alpha}} \tag{5}$$

Glossary

X_h, X_f = Output in the home business and formal sectors, respectively

N_h, N_f = Employment in the home business and formal sectors, respectively

S_h = Space input into the home business sector

K_f = Capital input into the formal sector

A = Cobb-Douglas production function intercept for the home business sector

B = Cobb-Douglas production function intercept for the formal sector

α, $1-\alpha$ = Output elasticities for labor and space in the home business sector

β, $1-\beta$ = Output elasticities for labor and capital in the formal sector

w_h, w_f = labor earnings in the home business and formal sectors

WR = earnings ratio of home business to other workers

NR = employment ratio of home business to other workers

θ, $\emptyset$ = annual growth rates of disembodied total factory productivity for the home business and formal sectors

$Z = (WR \cdot \frac{B}{A})^{\frac{1}{1-a}}$

SPR = ratio of the price of dwelling space per unit to other prices

p = growth rate of SPR

a,b = coefficients for WR and SPR in equations (14) to (20)

λ = growth rate of the capital stock in the formal sector

Ω = growth rate space input for the home business sector

Continuing in the neoclassical vein, one assumes that wages are equal to the marginal product of labor. Equations (1) and (2) are partially differentiated with respect to employment, and for the earnings ratio, one result is divided by the other.

$$W_h = \frac{\partial X_h}{\partial N_h} = A\alpha\left(\frac{S_h}{N_h}\right)^{1-\alpha} \tag{6}$$

$$W_f = \frac{\partial X_f}{\partial N_f} = B\alpha\left(\frac{K}{N_f}\right)^{1-\alpha} \tag{7}$$

$$WR = \frac{w_h}{w_f} = \frac{A}{B}\left[\frac{S_h/N_h}{K_f/N_f}\right]^{1-\alpha} \tag{8}$$

The crucial, not just expedient, assumption for this model is that workers shift from the home business to the formal sector to an extent that keeps the wage ratio unchanged. Then NR falls because N_h falls and N_f rises. If labor did not change sectors, a fall in WR would occur due to the faster accumulation of capital, K_f, than S_h, space, the complementary factor of production for HBEs.

A constant wage ratio, WR, implies that under perfect competition the underlying indirect utility function of labor, u, is multiplicative: $u = w_h\bar{s}$. Terms are expressed in units of the single consumer good being produced, so direct and indirect utiity are the same. Utility depends on both the extended fungibility of the dwelling, s, and on the consumption of other goods that can be bought with earnings. In this case $\bar{s}$ is assumed to be 1.0 for households without a home enterprise and a constant 2.0 for those with an HBE. Hence the equilibrium conditions are, $w_f = w_h\bar{s}$. Specifically, $\bar{s} = w_f/w_h = 2.0$.

If the utility derived from home location were constant, then its share of total utility would fall among HBE households as workers leave the less productive home enterprises. The terms in the utility function would simply be added to one another, and the equilibrium conditions would be, $w_f = w_h + \bar{s}$. The difference between the formal sector wageand the HBE earnings would be a constant, $w_f - w_h = \bar{s}$. As both wages rise because of capital accumulation, etc., in the formal sector and the abandonment of marginal HBEs, WR would actually rise because the difference between earnings in the two sectors would be relatively, though not absolutely, smaller. Note that to bring equilibrium about, more workers would have to abandon HBEs for the formal sector than they would with a constant WR. But just as the productivity of HBEs may be assumed to have diminishing returns, so will the utility (extended fungibility) derived from space be better at some locations and circumstances compared with others. As much as earnings differentials, these differences will influence the decision to operate an HBE and to keep that particular dwelling. At least the observed rough constancy of $WR = w_h/w_f = 1/2$ in poor countries suggests that such a pattern may exist. Households sacrifice more utility from wages to retain more from space.

Equation (8) can be rewritten as equation (9) which is the same as equation (3) in the text.

$$K_f = \frac{S_h}{NR}\left[WR\frac{B}{A}\right]^{\frac{1}{1-\alpha}} \qquad (9)$$

Alternatively,

$$NR = \frac{S_h/K_f}{\left(WR\frac{B}{A}\right)^{\frac{1}{1-\alpha}}} \qquad (10)$$

Since none of the terms in the denominator are assumed to vary for the time being, we can call that a constant, Z.

$$NR = \frac{S_h/K_f}{Z}$$

To compare employment ratios in an initial and final year, the subscripts, o and t, are added.

$$NR_o = \frac{S_{ho}/K_{fo}}{Z}$$

$$NR_t = \frac{S_{ht}/K_{ft}}{Z}$$

The capital stock grows at a compound rate of and will therefore equal $K_{fo}e^{\lambda t}$ in the final year. If the employment ratio has fallen by half, and if the amount of space is unchanged, then:

$$\frac{S_{ho}/K_{fo}e^{\lambda}t}{Z} = \frac{1}{2}\ \frac{S_{ho}/K_{fo}}{Z},$$

$$e^{\lambda t} = 2 \qquad (11)$$

This expression is equivalent to that well-known rule-of-thumb, that doubling time equals 70 divided by the percentage growth rate. the logarithm of 2 is actually .693147, but who can remember that?

$$t = \frac{\ell n2}{\lambda} \qquad (12)$$

Note that the elasticity of the time period with respect to the growth rate of the capital stock is exactly -1. This effect occurs whenever the product of the exponents, λt in this case, equals a constant.

If the amount of space potentially available for home businesses grows at a rate, Ω, then $S_{ho}e^{\Omega t}$ will appear on the left side of equation (11), and equation (12) becomes,

$$t = \frac{\ell n 2}{\lambda - \Omega} \tag{13}$$

If space available grows, doubling time will be greater; but if it shrinks, due to inadequate urban policies, them omega is negative, and doubling time falls.

Using the direct approach, equation (4) of the text related the employment ratio to the wage ratio and the space-price ratio. One can specify that the relative price of space rises at the continually compounded rate, p. If the parameters of equation (14) remain constant, one can estimate the time required for the share of employment in home enterprises to fall by half, as follows.

$$NR_o = aWR = bSPR_c \tag{14}$$

$$NR_t = aWR - bSPRe^{pt} \tag{15}$$

$$\frac{1}{2} NR_o = NR_t \tag{16}$$

$$\frac{1}{2}[aWR - bSPR_o] = aWR - bSPR_o e^{pt} \tag{17}$$

$$e^{pt} = \frac{aWR}{2bSPR_o} + \frac{1}{2} \tag{18}$$

$$pt = \ell n[\frac{aWR}{2bSPR_o} + \frac{1}{2}] \tag{19}$$

$$t = \frac{1}{p} \ell n[\frac{aWR}{2bSPR_o} + \frac{1}{2}] \tag{20}$$

Since the term in brackets in equations 19 and 20 is again a constant, we find that the elasticity of t, the doubling time with respect to p, the compound relative price rise, is -1. If the price of space begins to rise three times as fast as other prices, then the time that will elapse before the share of home businesses in employment has fallen by half will decline to a third of what it was.

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